

We Claim:

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1. A method of treating a meat product to reduce a microbial population in the meat product, the method comprising the steps of:
 - (a) treating said meat product with an antimicrobial composition comprising:
 - (i) an effective antimicrobial amount comprising at least 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to 12 carbon atoms; and
 - (ii) an effective antimicrobial amount comprising at least 20 ppm of one or more carboxylic acids having up to 18 carbon atoms; and
 - (b) reducing the microbial population.
 2. The method of claim 1 wherein the population reduction comprises at least one \log_{10} reduction in the microbial population.
 3. The method of claim 1 wherein the population reduction comprises at least two \log_{10} reduction in the microbial population.
 4. The method of claim 1 wherein the population reduction comprises at least three \log_{10} reduction in the microbial population.
 5. The process of claim 2 wherein the population comprises a human pathogen.
 6. The process of claim 4 wherein the population comprises *Escherichia coli*.
 7. The method of claim 1 wherein the meat product is selected from a muscle meat including beef, pork, veal, buffalo or lamb.

8. The method of claim 1 wherein the meat product is sea food including scallops, shrimp, crab, octopus, mussels, squid or lobster.

9. The method of claim 1 wherein the meat product is poultry including
5 chicken, turkey, ostrich, game hen, squab or pheasant.

10. The method of claim 1 wherein the peroxycarboxylic acid comprises one or more peroxycarboxylic acids having from 2 to 4 carbon atoms and a peroxycarboxylic acid having from 8 to 12 carbon atoms.

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11. The method of claim 7 wherein the peroxycarboxylic acid comprises peroxyacetic acid and peroxyoctanoic or peroxydecanoic acid, or mixtures thereof.

12. The method of claim 10 wherein the peroxycarboxylic acid having from
15 2 to 4 carbon atoms is peroxyacetic acid and the peroxycarboxylic acid having from 8 to 12 carbon atoms is peroxyoctanoic acid resulting in a ratio of about 10 to about 1 parts by weight of peroxyacetic acid per each 1 part of carboxylic acid.

13. The method of claim 1 wherein the carboxylic acid is acetic acid.
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14. The method of claim 1 wherein the carboxylic acid is an alpha-hydroxy mono or dicarboxylic acid having from 3 to 6 carbon atoms.

15. The method of claim 14 wherein the carboxylic acid is lactic acid.
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16. The method of claim 1 wherein said antimicrobial composition comprises about 2 to 25 parts by weight of hydrogen peroxide per each one million parts of the composition.

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17. The method of claim 1 wherein said antimicrobial composition is applied to the meat product by means of a spray.

18. The method of claim 1 wherein said antimicrobial composition is applied
5 to the meat product by means of a fog.

19. The method of claim 1 wherein said antimicrobial composition is applied to the meat product by means of a foam.

20. The method of claim 1 wherein said antimicrobial composition is applied
10 to the meat product by applying in the form of a thickened or gelled solution.

21. The method of claim 1 wherein all or part of the meat product is dipped
15 in said antimicrobial composition.

22. The method of claim 21 wherein a solution comprising the antimicrobial composition is agitated.

23. The method of claim 1 which further includes a vacuum treatment step.
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24. The method of claim 1 which further includes the step of applying an activated light source to said meat product.

25. An antimicrobial composition adapted for cleaning and sanitizing meat
25 product comprising:

(a) about 0.5 wt-% to about 20 wt-% of a mixture of one or more peroxycarboxylic acids having from 2 to 4 carbon atoms and one or more peroxycarboxylic acids having from 8 to 12 carbon atoms;

(b) from about 0.5 wt-% to about 60 wt-% of an alpha-hydroxy mono or
30 dicarboxylic acid having from 3 to 6 carbon atoms

35. An antimicrobial composition adapted for treating meat product consisting essentially of:

- (a) a mixture of peroxyacetic and peroxyoctanoic acid in a ratio of about 10:1 to about 1:1;
- (b) from about 0.1 wt-% to about 10 wt-% of lactic acid;
- (c) from about 4 wt-% to about 10 wt-% of hydrogen peroxide; and
- (d) from about 0.5 wt-% to about 1.5 wt-% of a sequestering agent.

36. The composition of claim 35 wherein the sequestering agent is the sequestering agent is 1-hydroxyethylidene-1,1-diphosphonic acid.

37. A method of treating a meat product to reduce a microbial population in the meat product, the method comprising the steps of:

- (a) spraying an aqueous antimicrobial treatment composition onto said meat product at a pressure of at least 50 psi at a temperature of up to about 60°C resulting in a contact time of at least 30 seconds, the antimicrobial composition comprising an effective antimicrobial amount comprising least 2 ppm of one or more carboxylic acid, peroxycarboxylic acid or mixtures thereof; and
- (b) achieving at least a one log₁₀ reduction in the microbial population.

38. The method of claim 37 wherein the antimicrobial composition comprises an effective antimicrobial amount comprising at least 2 ppm of one or more peroxycarboxylic acids having up to 12 carbon atoms; and at least 20 parts of one or more carboxylic acids having up to 18 carbon atoms.

39. The method of claim 37 wherein the peroxycarboxylic acid comprises peroxyacetic acid, peroxyoctanoic acid, peroxydecanoic acid or mixtures thereof.

27/ 40. The method of claim 37 wherein the carboxylic acid comprises acetic acid, lactic acid or mixtures thereof.

28/ 41. The method of claim 37 wherein the antimicrobial composition
5 comprises at least about 5 wt% hydrogen peroxide.

29/ 42. The method of claim 37 wherein the antimicrobial compositions are applied by means of an electrostatically accelerated spray.

Sub A 103/ 43. A method of treating a meat product to reduce a microbial population in the meat product, the method comprising the steps of:
placing the meat product in a chamber at atmospheric pressure;
filling the chamber with condensing steam comprising an antimicrobial composition for a short duration; and
15 quickly venting and cooling the chamber to prevent browning of the meat product; wherein the duration of the steam thermal process may be from about 5 seconds to about 30 seconds and the chamber temperature may reach from about 50 °C to about 93°C.

20 44. The method of claim 43 wherein the antimicrobial composition comprises an effective antimicrobial amount comprising at least 2 ppm of one or more peroxydicarboxylic acids having up to 12 carbon atoms; and at least 20 parts of one or more carboxylic acids having up to 18 carbon atoms.

25 31/ 45. The method of claim 44 wherein the peroxydicarboxylic acid comprises peroxyacetic acid, peroxyoctanoic acid, peroxydecanoic acid or mixtures thereof.

30/ 46. The method of claim 44 wherein the carboxylic acid comprises acetic acid, lactic acid or mixtures thereof.

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~~47.~~ The method of claim ~~44~~ wherein the antimicrobial composition comprises at least about 5 wt% hydrogen peroxide.

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48. The method of claim 44 wherein the antimicrobial compositions are applied by means of an electrostatically accelerated spray.

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